FLEX FUEL GASIFIER SIMULATION MODEL (v1.0)

USER MANUAL

Developed By:

Gas Processing Research Laboratory

Department of Chemical and Biological Engineering

Illinois Institute of Technology

Chicago, IL.

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Installing the FFGSM Application

Installing the application is very easy. Please follow these steps.

1) Download or obtain a copy of the application package from the source.
2) Run the application setup file and follow through the setup instructions.

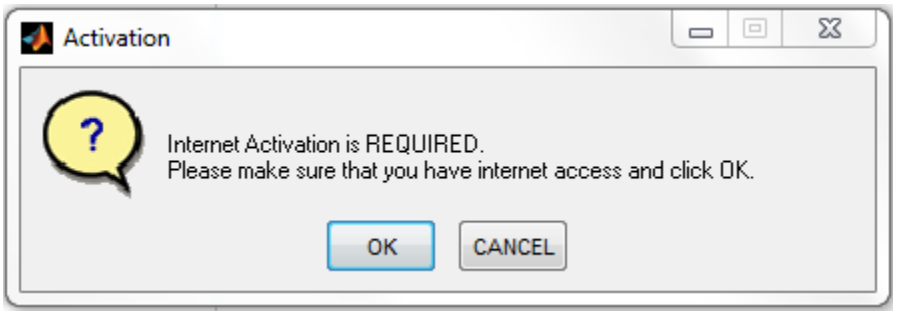
Starting the FFGSM Application

In order to start the application:

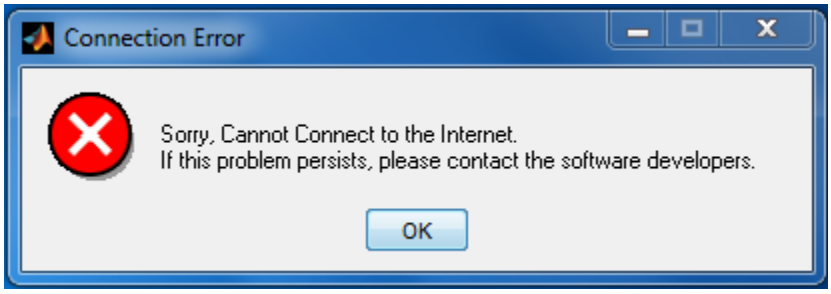
1) Click on Start button and browse to the application folder (FFGSM).
2) Click on the application folder and select the application name (FFGSM.exe).

Note: Please wait patiently because it might take a couple of minutes for the application to start.

3) The first time you run the application, you need to activate it. Please make sure you have the internet connection in order to activate it. The following activation dialog box appears.

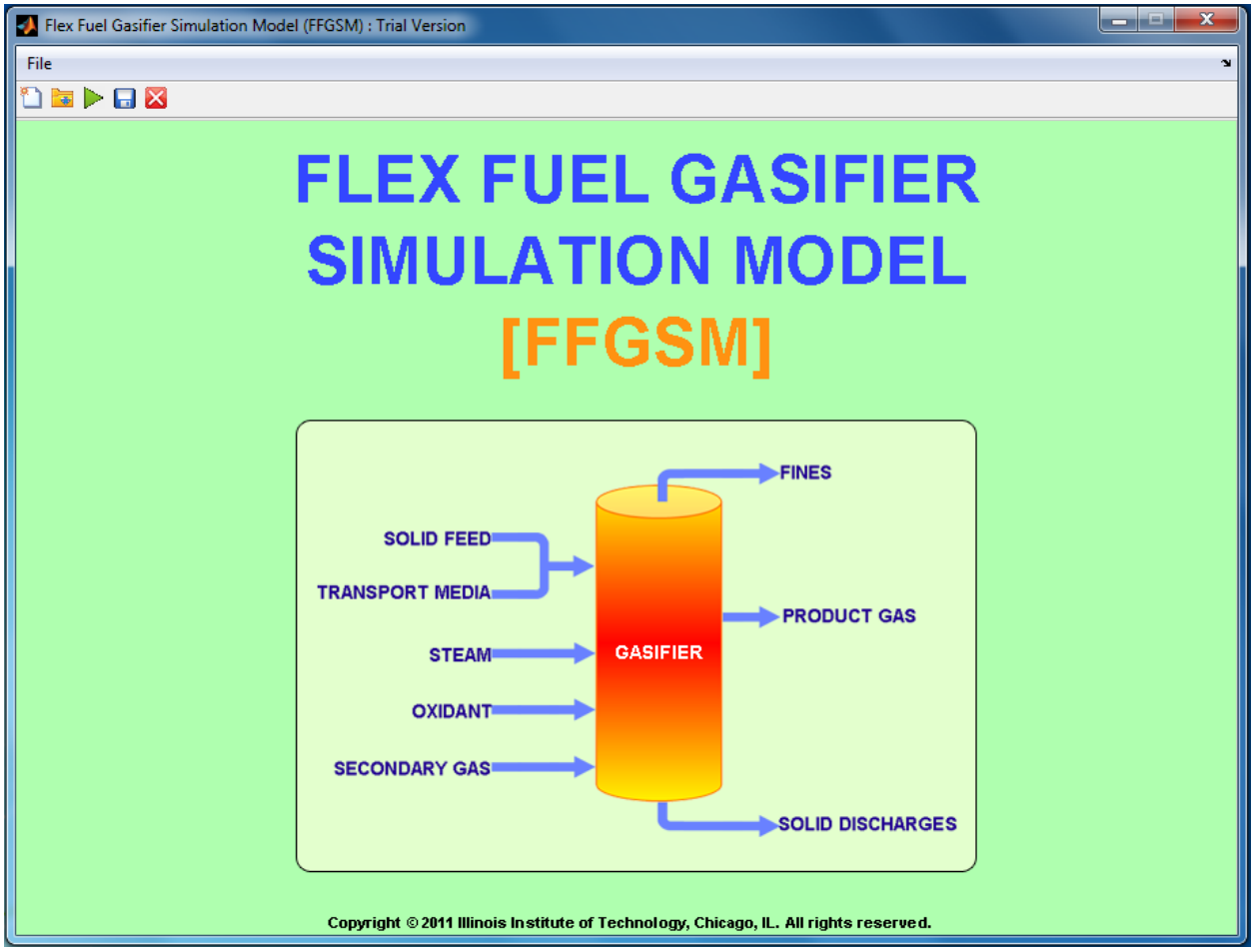


- Click ‘OK’ to activate the application.
- If you click ‘CANCEL’, the dialog box will close and the application will not run.
- If you click ‘OK’ but don’t have the internet connection, the following message window will appear.


Connection Error
Sorry, Cannot Connect to the Internet.
If this problem persists, please contact the software developers.
OK

- Click ‘OK’ to close the message window.
- Re-run the application if you would like to activate the program later whenever you have the internet connection.

Once the activation is successful, the application starts and you will see the following screen:


Flex Fuel Gasifier Simulation Model (FFGSM) : Trial Version
File
FLEX FUEL GASIFIER
SIMULATION MODEL
[FFGSM]
FINES
SOLID FEED
TRANSPORT MEDIA
PRODUCT GAS
STEAM
GASIFIER
OXIDANT
SECONDARY GAS
SOLID DISCHARGES
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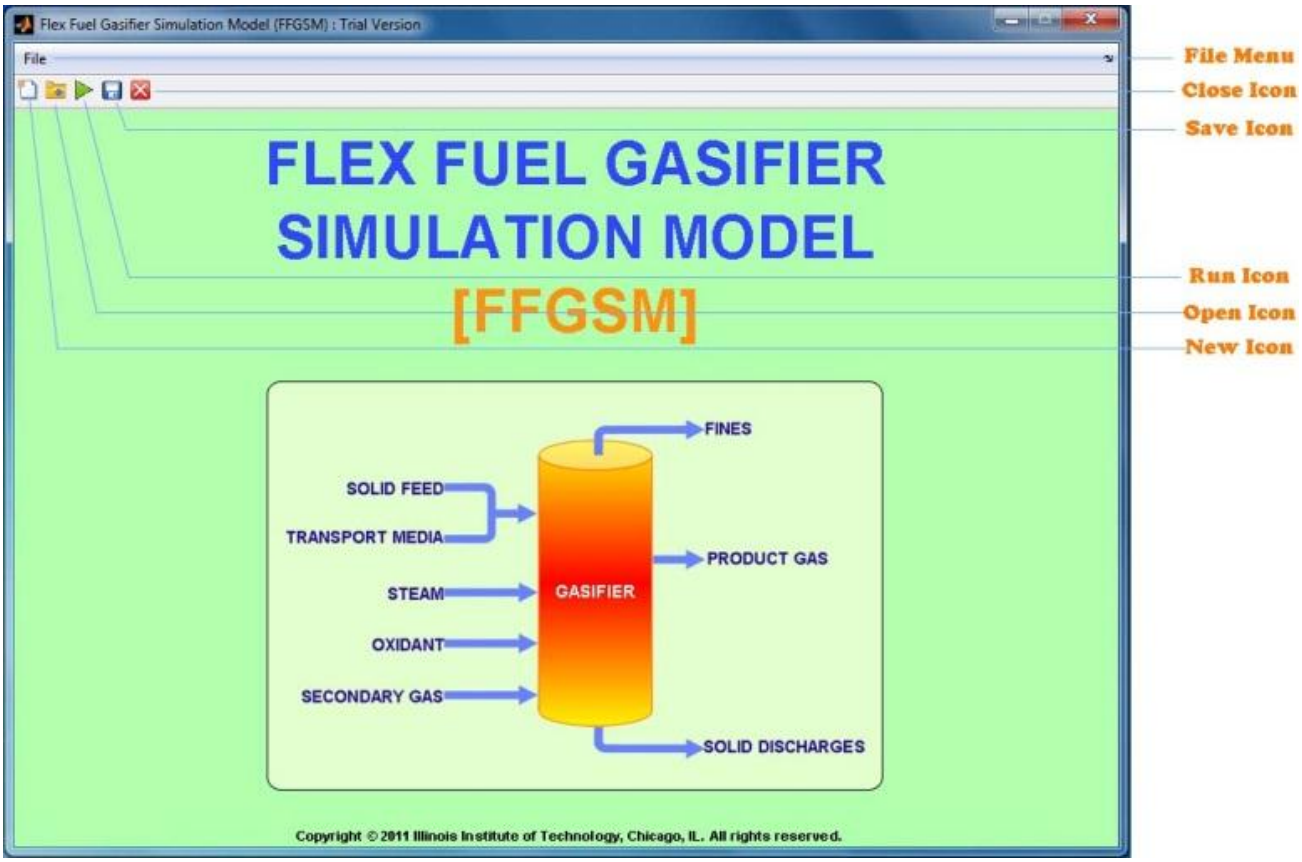
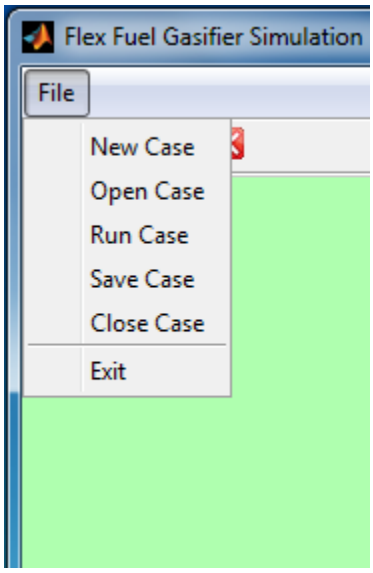
Understanding the Layout of the Application Window.

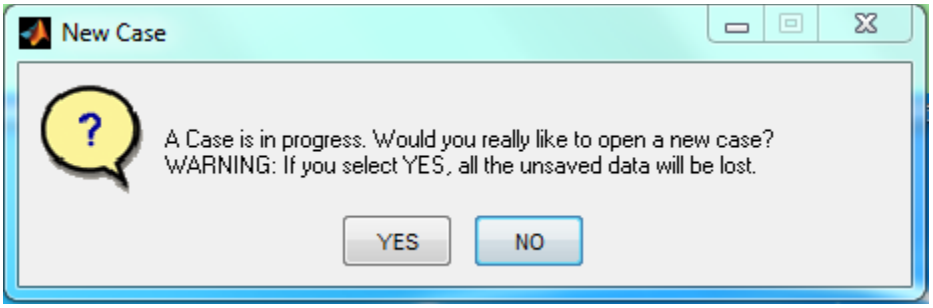


File Menu

The file menu contains several options some of which are also available as icons in the toolbar right underneath the file menu.

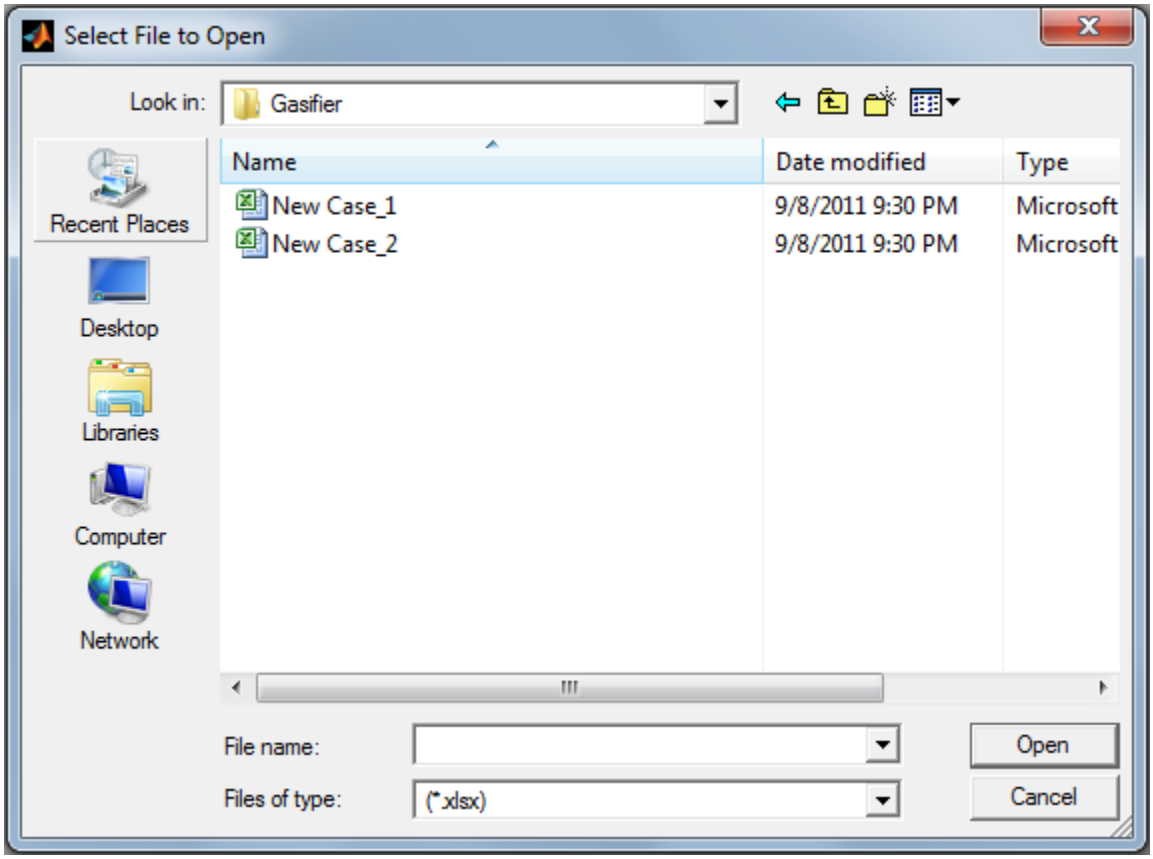


1) **New Case:** Opens a new project. Same as the 'New Case Icon'.
   If a project is in progress and the New Case option is selected from the File menu or the New Case Icon is clicked, the following message appears:

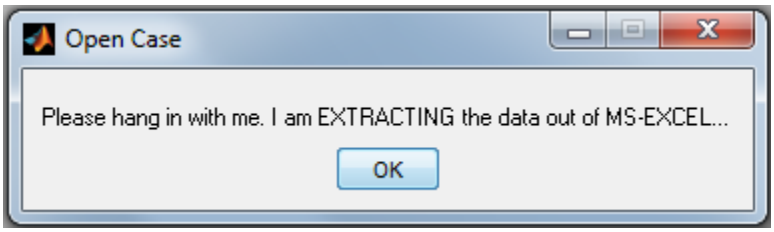

New Case
A Case is in progress. Would you really like to open a new case?
WARNING: If you select YES, all the unsaved data will be lost.
YES
NO

- Click 'Yes' if you want to abort the current case and open a new case.
- Click ‘No’ if you want to stay with the current case.

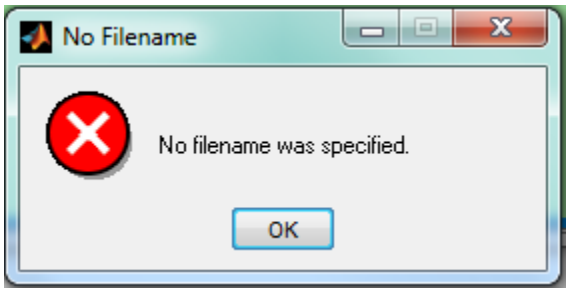
2) **Open Case:** Opens a previously saved case in the MS-Excel format and loads all the values from the file to the input fields. The following dialog box appears when the Open Case is selected:



If you select a case and click on 'Open' the following dialog box appears and once the data is loaded, the dialog box automatically closes.

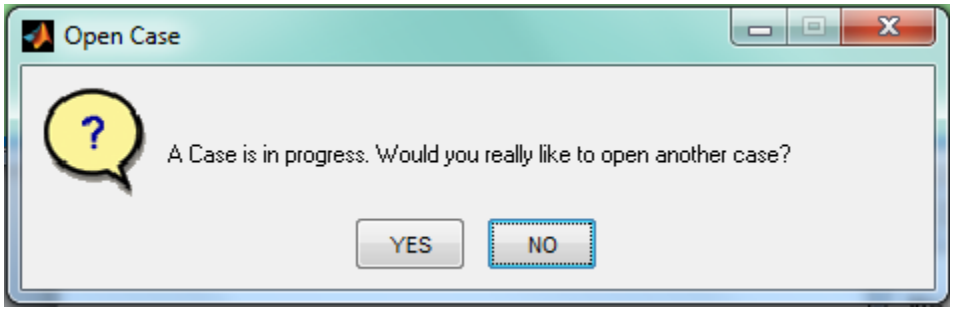


If you click 'Cancel' in the Select File to Open Dialog box above, the following message window appears:



Click 'OK' to close the message box.

If a case is already in progress, clicking the 'Open Case' Icon displays the following message:

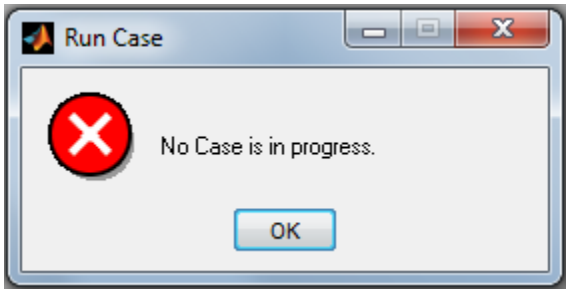


If you select ‘YES’ the ‘Select File to Open’ dialog box opens again allowing you to select a file to open.

If you select ‘NO’ the message box closes without making changes to the current case.

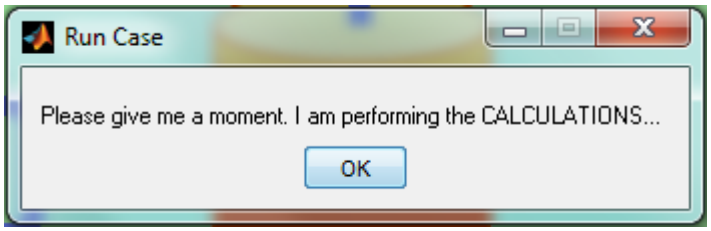
3) **Run Case:** Runs the case if all the inputs are correctly entered.

If no case is in progress and the ‘Run Case’ is selected from the file menu or by clicking on the ‘Run Case Icon’ the following message box is displayed:

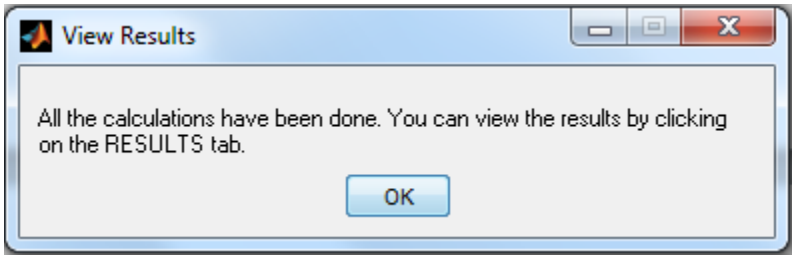


Click the 'OK' button to close the message window.

If a case is in progress and all the inputs are correctly entered, the following message appears:

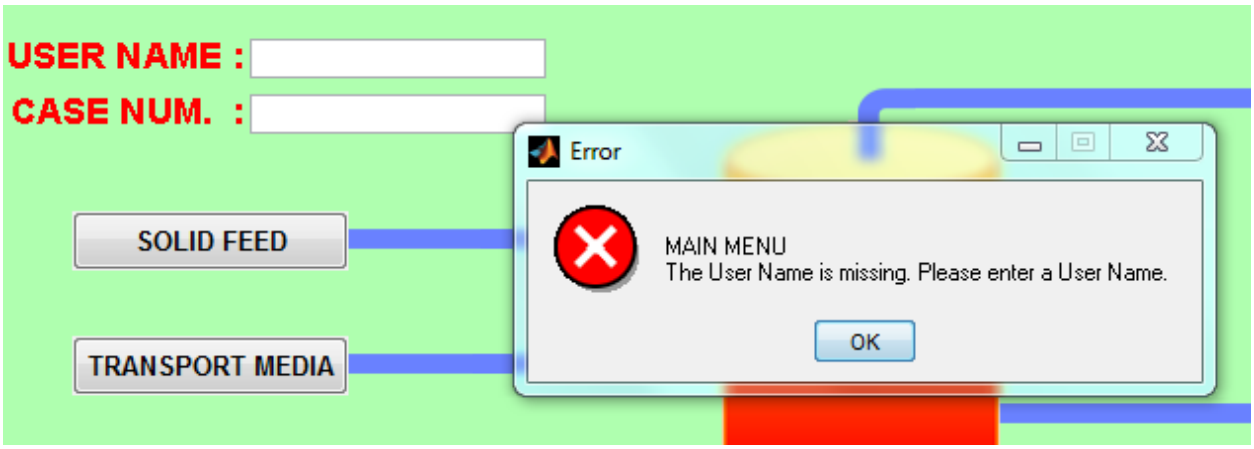


As soon as the calculations are done, the ‘Run Case’ message box closes and the following message appears:



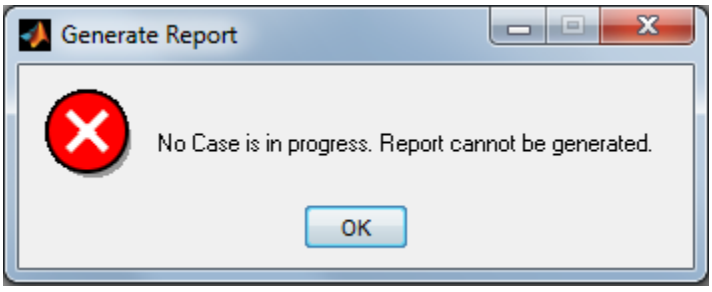
Click 'OK' to close the message box.

If the inputs are not correctly entered, error messages pop up when you try to run the case. E.g. If the USER NAME field is empty, the following message pops up.

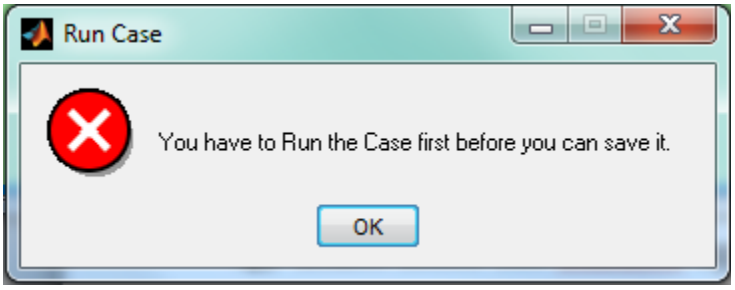


4) **Save Case:** Saves a current case into an MS-Excel File.

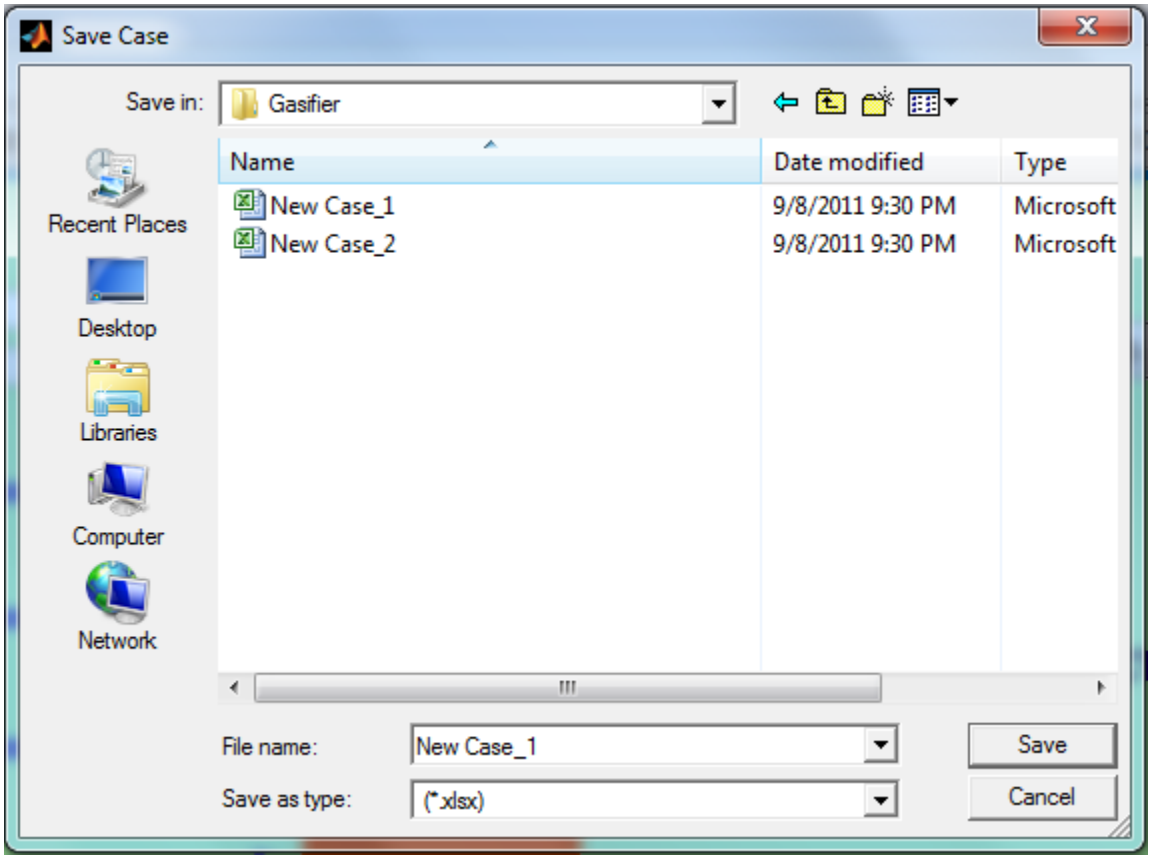
If no case is in progress, the following message window appears:



If a case is in progress but it hasn't been run yet, the following message appears:

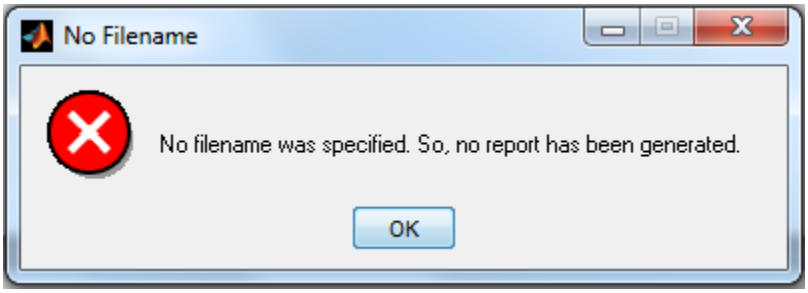


If a case has been successfully run, then it is ready to be saved. The following dialog box appears:

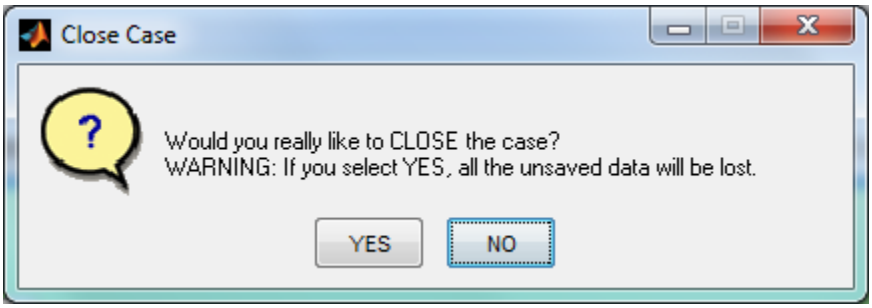


A filename appears by default in the ‘File name:’ section. This default filename is the combination of the user name and case number. You can either use the default file name or a different file name of your own. Click ‘Save’ to save the case.

If you click ‘Cancel’ the following message box appears.



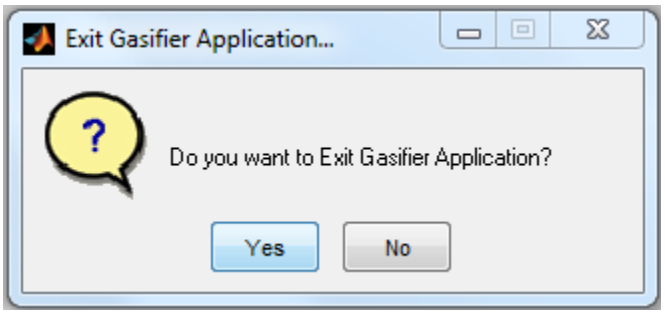
5) **Close Case:** Closes a currently active case. The following dialog box appears upon selecting this open.



Click 'YES' to close the current case.

Click 'NO' to stay with the current case.

6) **Exit:** Exits the FFGSM Application. The following dialog box appears:



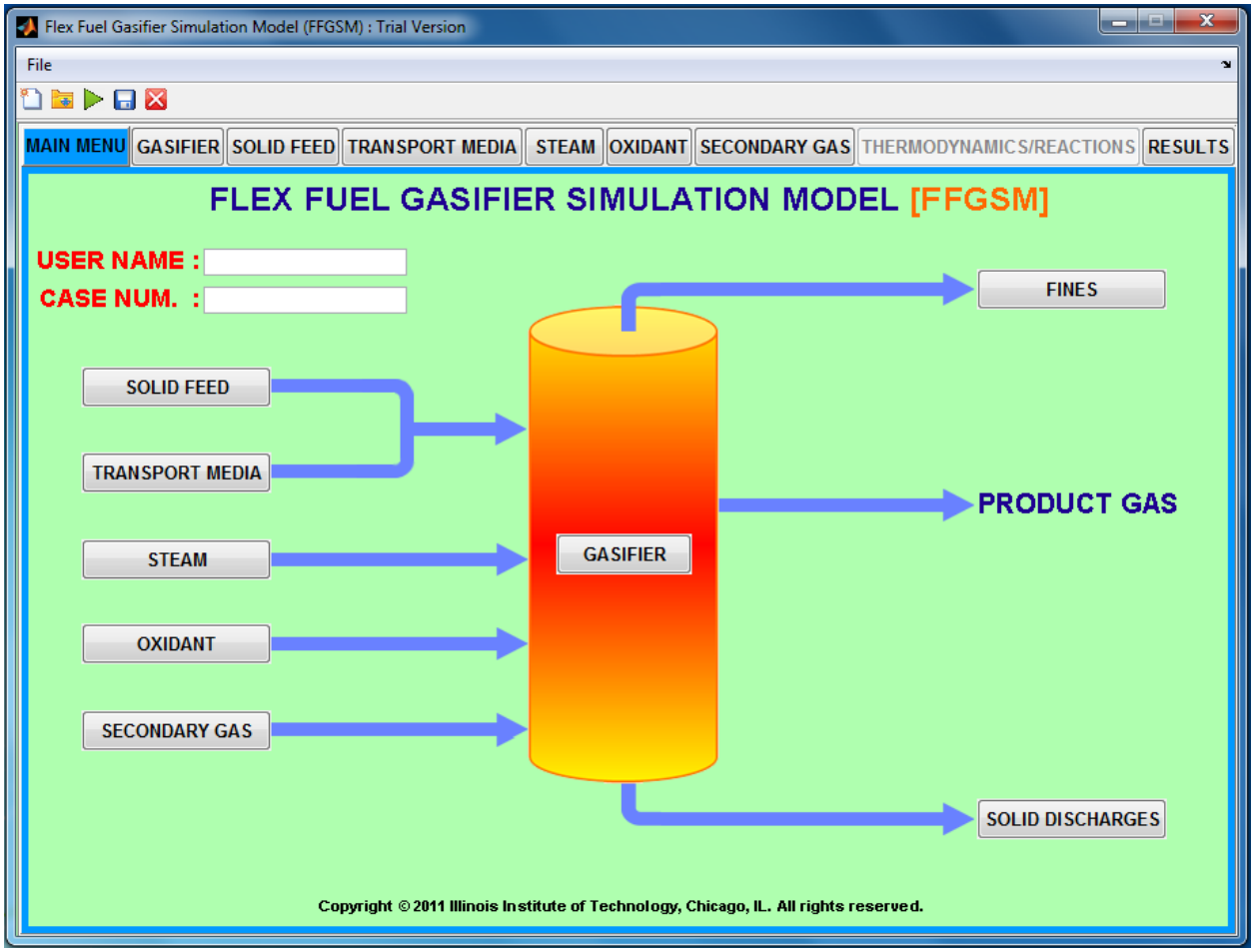
Click 'Yes' to exit the application or click 'No' to stay in the application.

Starting a New Project

In order to start a new project:

1) Select File → New, OR
2) Click on the New Icon on the toolbar.

The following window appears in the gray project window.

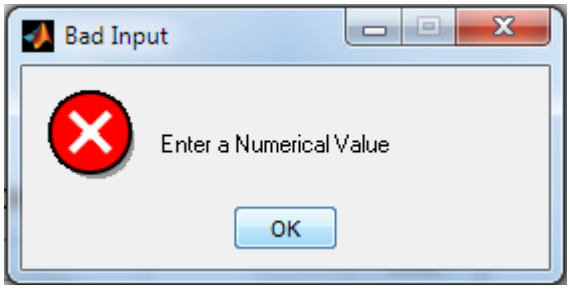


As it can be seen from the figure that there are various tabs (which are explained next) that will allow us to navigate to the respective area and enter the inputs required to perform calculations.

Some Common Error Flags

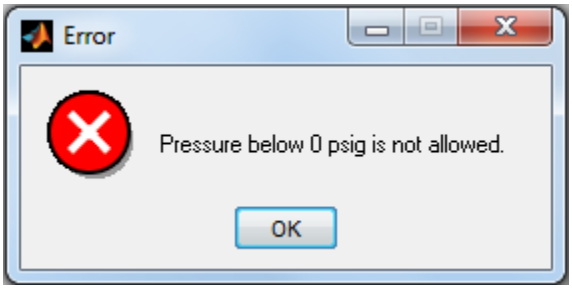
Error flags have been incorporated into the gasifier application which will pop up if the inputs are entered incorrectly. The following are some common error flags:

1) **Non-Numeric Input:** All the input fields take numeric values only. Entering any non-numeric data like a text or a combination of numbers and text generates the following error flag.



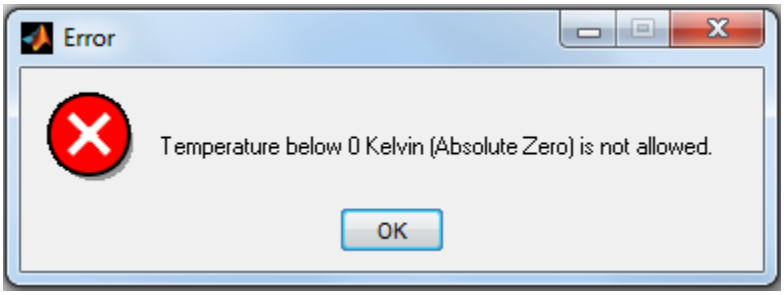
Clicking the 'OK' button closes the error message and sets the respective field to empty.

2) **Pressure Input:** All the pressure fields accept positive pressure values. Anything that corresponds to a negative or vacuum pressure genets the following error flag.



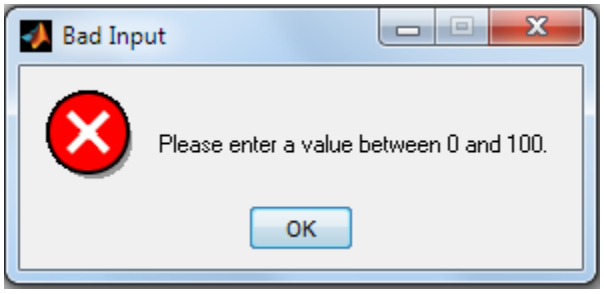
Clicking the 'OK' button closes the error message and sets the respective field to empty.

3) **Temperature Input:** All temperature fields accept temperature values that are greater than the absolute zero. Any value less than the absolute zero generates the following error flag.



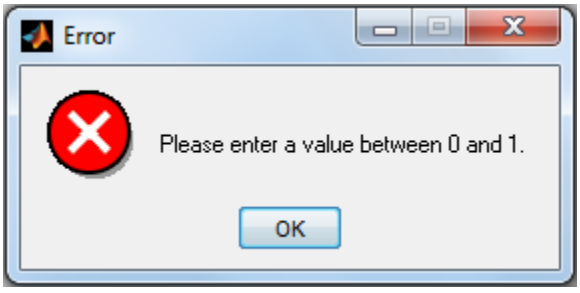
Clicking the 'OK' button closes the error message and sets the respective field to empty.

4) **Percentage Input:** All input fields that take percentage input only take values from 0 to 100. Any value outside of that range generates the following error flag.



Clicking the 'OK' button closes the error message and sets the respective field to empty.

5) **Molar Ratio Input:** All input fields that take ratio as input only take values from 0 to 1. Any value outside of that range generates the following error flag.



Clicking the 'OK' button closes the error message and sets the respective field to empty.

Understanding the Tabs

The Tab bar contains a series of Tabs that are aligned beside each other right underneath the Toolbar. These tabs provide access to various Panels and Sub-Panels. A Panel is an area below the Tab bar which is surrounded by a blue rectangle. A Sub-Panel is an area within a Panel which is surrounded by a green rectangle.

Model Tab

The Model Tab is the default tab in a project. Clicking on the Model tab provides access to the Model Panel. The Model Panel has the diagram of a gasifier plant along with arrows which indicate the input streams and the output streams.

The Input Streams are: Solid Feed, Transport Media, Steam, Oxidant, Secondary Gas.

The Output Streams are: Fines, Solid Discharges, and Product Gas.

The various tabs available in the Model Panel are explained below.

1) **Solid Feed Tab:** This tab opens the Feed Input Sub-Panel. It is the same as clicking on the Solid Feed Input Tab on the Tab bar above and then clicking on Feed Input Tab. (Click here to go to the Solid Feed section)

2) **Transport Media Tab:** This tab opens the Transport Media Panel where the transport media (transport gas, water) input data can be entered. It is the same as clicking on the Transport Media Tab on the Tab bar above. (Click here to go to the Transport Media section)

3) **Steam:** This tab opens the Steam where steam input data can be entered. It is the same as clicking on the Steam on the Tab bar above. (Click here to go to the Steam section)

4) **Oxidant Tab:** This tab opens the Oxidant Panel where the oxidant input data can be entered. It is the same as clicking on the Oxidant Tab on the Tab bar above. (Click here to go to the Oxidant section)

5) **Secondary Gas Tab:** This tab opens the Secondary Panel. This feature has been disabled for the Trial version. (Click here to go to the Secondary Gas section)

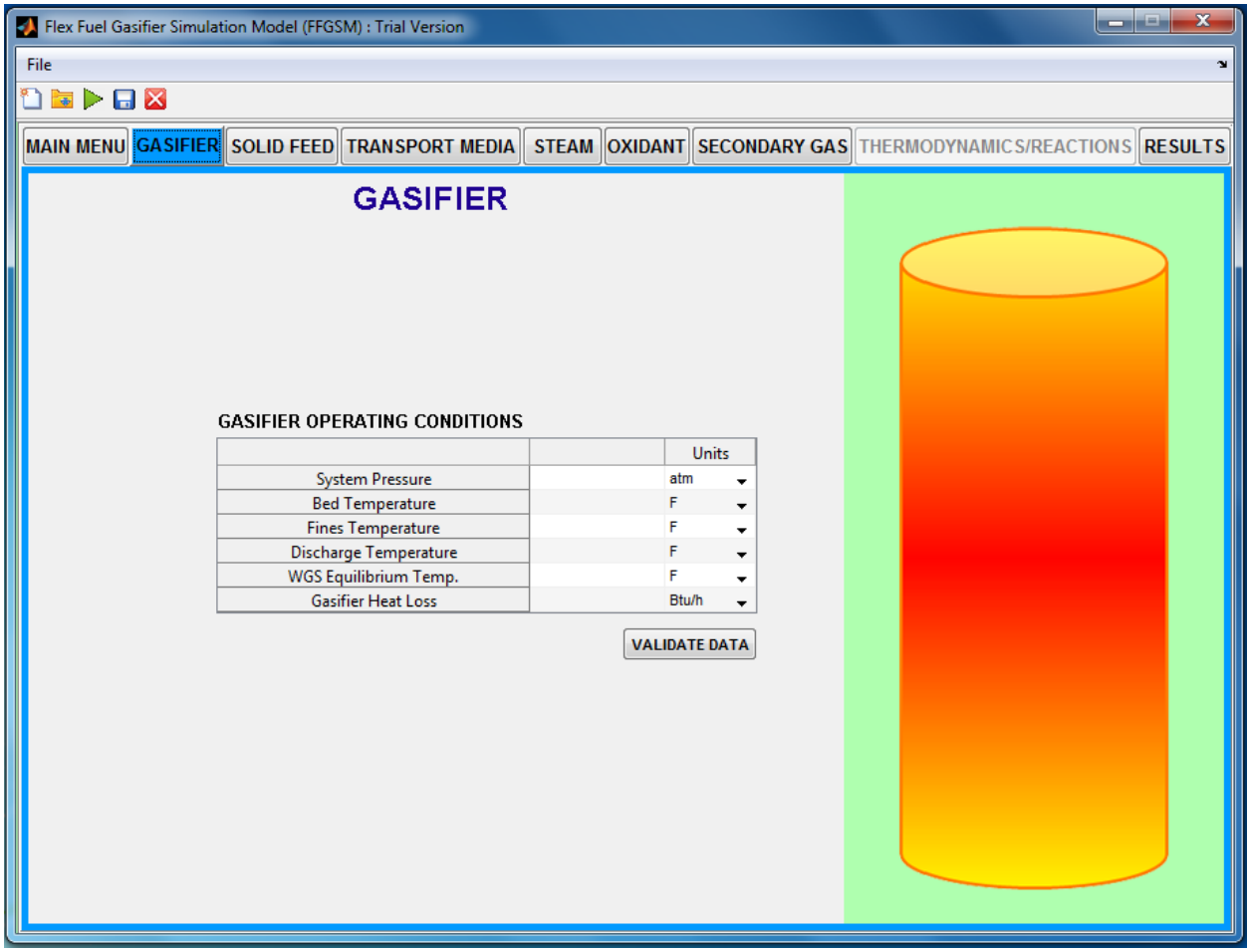
6) **Gasifier Tab:** This tab opens the Gasifier Panel where the gasifier input data can be entered. It is the same as clicking on the Gasifier Tab on the Tab bar above. (Click here to go to the Gasifier section)

7) **Fines Tab:** This tab opens the Fines and Discharges Sub-Panel where the fines input data and discharges input data can be entered. It is the same as clicking on the Solid Feed Tab on the Tab bar above and then clicking on the Fines and Discharges Tab. (Click here to go to the Fines & Discharges section)

8) **Discharges Tab:** Same as the Fines Tab. This tab opens the Fines and Discharges Sub-Panel where the fines input data and discharges input data can be entered. It is the same as clicking on the Solid Feed Input Tab on the Tab bar above and then clicking on the Fines and Discharges Tab. (Click here to go to the Fines & Discharges section)

Gasifier Tab

The Gasifier Tab opens the Gasifier Panel which is shown below:



The inputs in the Gasifier Operating Conditions Table are explained below:

1) **System Pressure:** Enter the pressure inside the gasifier plant.

2) **Bed Temperature:** Enter the temperature of the gasifier plant.

3) **Fines Temperature:** Enter the temperature at which the fines are exiting from the gasifier.

4) **Discharges Temperature:** Enter the temperature at which the discharges are exiting from the gasifier.

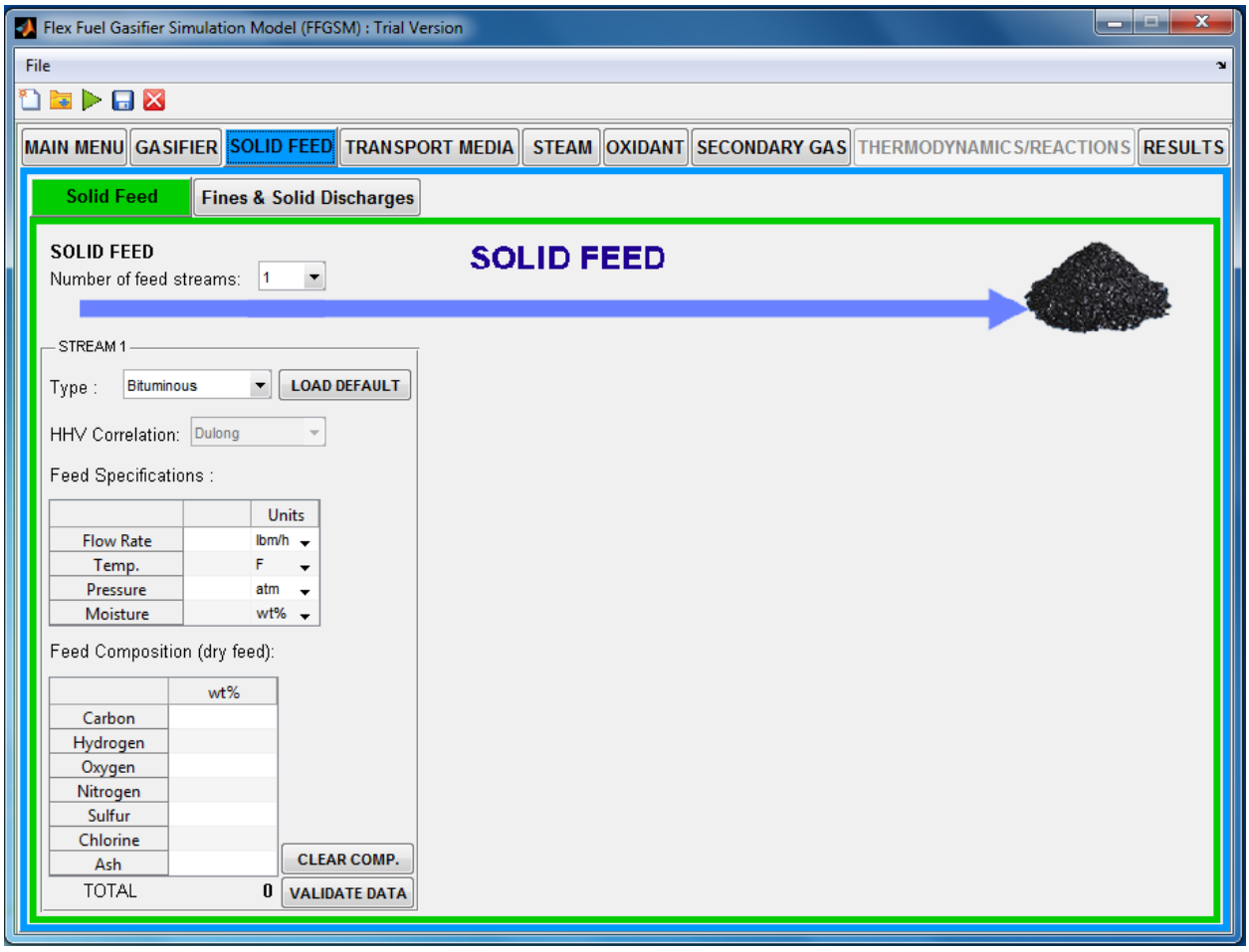
5) **WGS Equilibrium Temp.:** Enter the temperature of the water-gas-shift equilibrium.

Solid Feed Input Tab

The Solid Feed Input Tab opens the Solid Feed Input Panel. This panel has two tabs – Feed Input Tab and Fines & Discharge Tab. These tabs provide access to the respective sub-panels – Feed Input Sub-Panel and Fines & Discharge Sub-Panel.

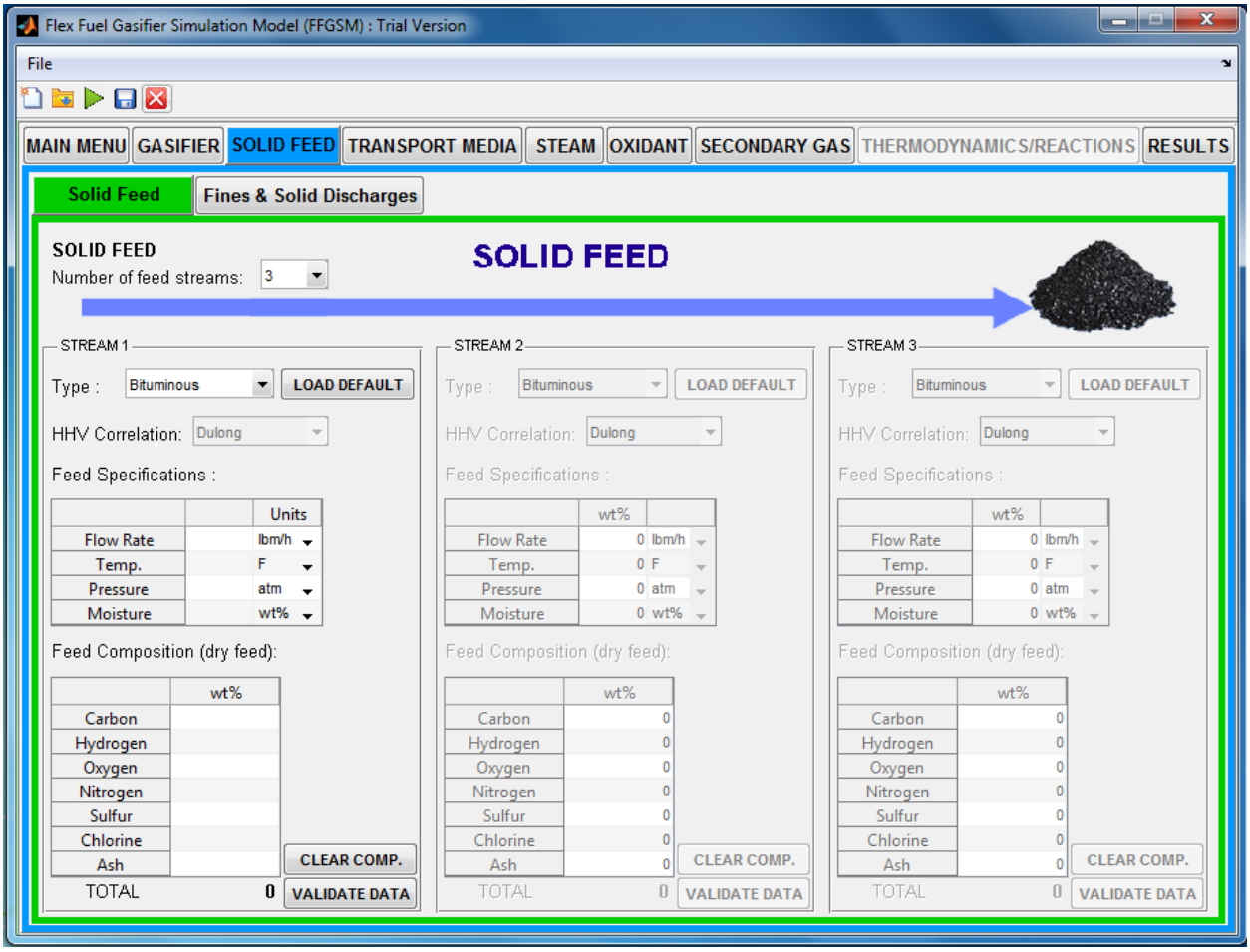
Feed Input Tab

The Feed Input Tab is the default tab and the Feed Input Sub-Panel is the default panel and it is shown below:



The explanation of the various input fields are as follows:

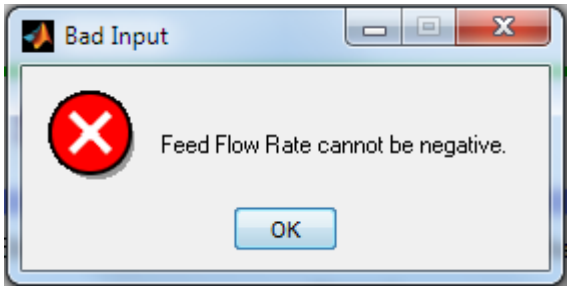
1) **Number of feed streams:** The number of feed streams can be specified here by selecting a number from the dropdown list. 1 is the default number of streams. Up to 3 feed streams are supported by the application. But, for the Trial version, only 1 feed stream is available.



2) **Feed Type:** This drop down list lets the user select the type of feed. The following types of feed are available:
   a) **Bituminous**
   b) **Sub-Bituminous**
   c) **Anthracite**
   d) **Lignite**
   e) **Peat**
   f) **Sludge**
   g) **Wood**

   Once the Feed Type is selected, you can either specify the % wt composition of the various elements in the feed or click on ‘LOAD DEFAULT’ button to load the default compositions.

3) **Flow Rate:** Enter the mass flow of the feed. The unit is 'lbm/hr'. If a negative feed flow rate is entered, the following error flag is generated:



Clicking the 'OK' button closes the error message and sets the respective field to empty.

4) **Temperature:** Enter the temperature of the feed.

5) **Moisture:** Enter the moisture content in the feed as percentage ('%') of the total feed flow.

6) **Feed Composition (dry feed):** Enter the 'wt %' of the seven main species (Carbon, Hydrogen, Oxygen, Nitrogen, Sulfur, Chlorine, Ash) in the dry feed flow (total feed flow – moisture).

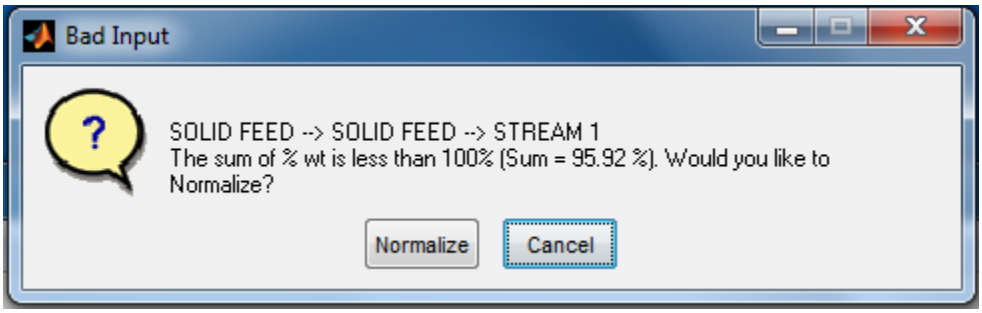
The 'VALIDATE DATA' button checks if the data is correctly entered. It also checks if the sum of the % wt compositions adds up to 100%. If not the following three scenarios will occur.

a) **The sum is > 100 %:** If this is the case, the following flag will appear:

Bad Input
SOLID FEED --> SOLID FEED --> STREAM 1
The sum of % wt is greater than 100% (Sum = 145.98 %). Would you like to Normalize?
Normalize
Cancel

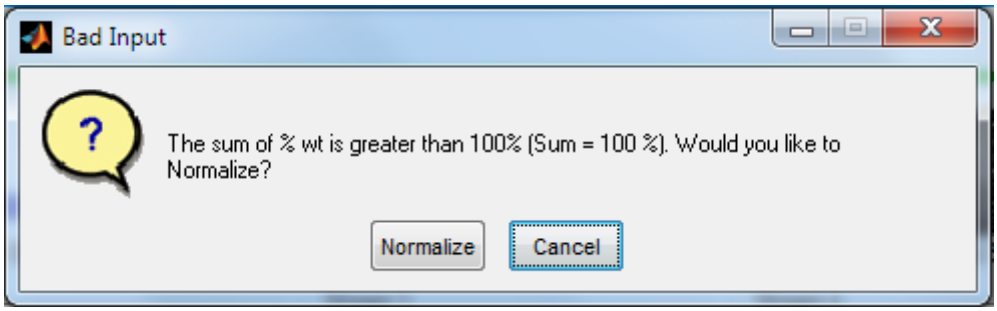
If you choose to normalize to 100 % depending on the weight of 'wt %' of the individual species, click on the 'Normalize' button. Doing so populates the normalized values of 'wt %' in the feed composition table.

b) The sum is < 100 %: If this is the case, the following flag will appear:


Bad Input
SOLID FEED --> SOLID FEED --> STREAM 1
The sum of % wt is less than 100% (Sum = 95.92 %). Would you like to Normalize?
Normalize
Cancel

If you choose to normalize to 100 %, depending on the weight of 'wt %' of the individual species, click on the 'Normalize' button. Doing so populates the normalized values of 'wt %' in the feed composition table.

c) The sum is = 100 %: If the 'wt %' values entered are decimal values then sometimes a flag might appear saying that the sum of % wt is greater than 100 % (Sum = 100 %) as shown below. This happens because of the truncation errors and because of the way computers handle numbers.

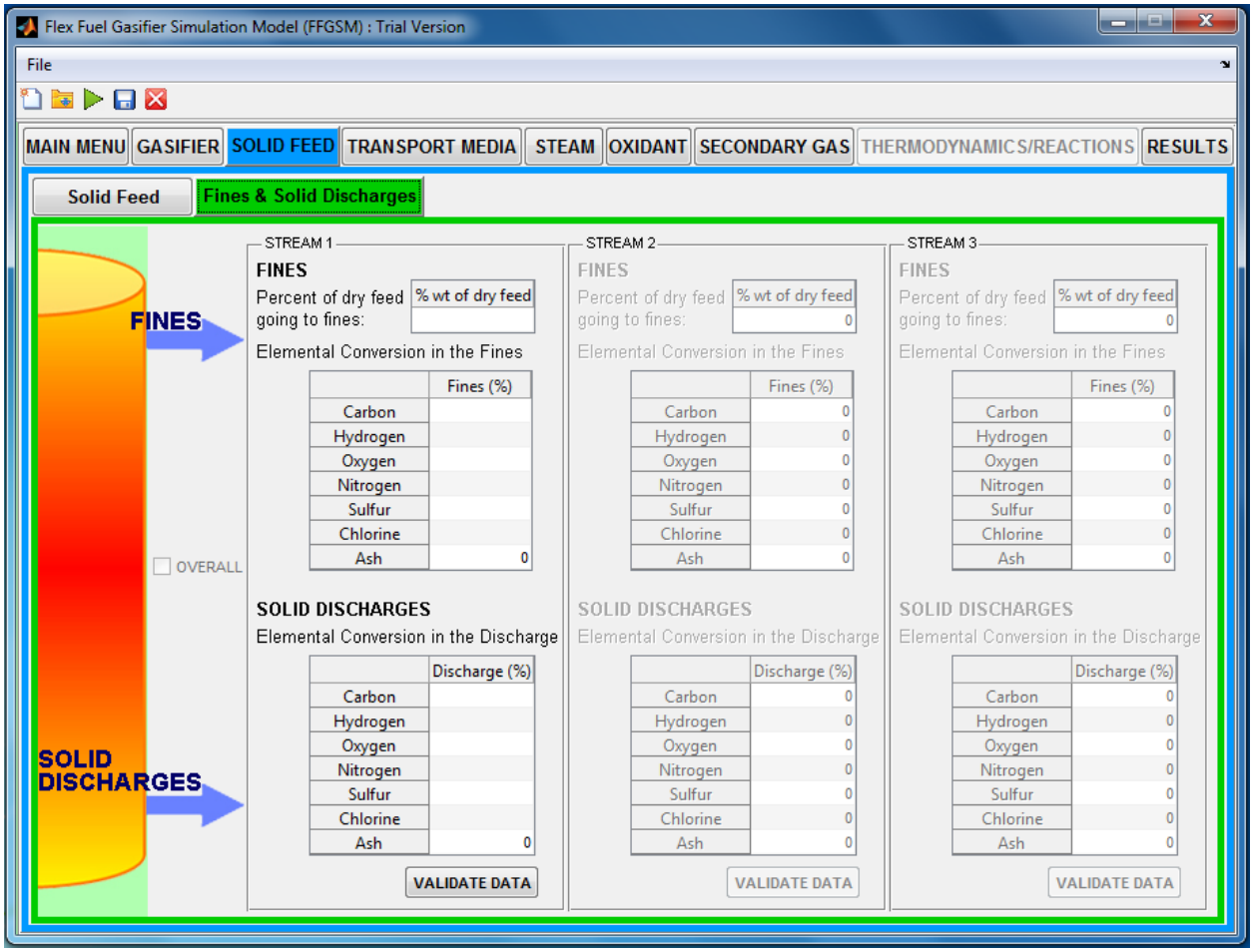


If you run into this situation, simply click on 'Normalize' and the values that you entered (which add up to 100%) won't change at all. In reality they have changed a little bit out in the very far decimal place but that won't affect the calculation.

The ‘CLEAR COMP.’ button clears the wt % composition table if you would like to enter your own values in that table.

Fines and Solid Discharges Tab

The Fines and Discharge Tab opens the Fines and Discharge Sub-Panel. This is the same as clicking on the Fines Tab or Discharges Tab in the Model Panel.



The descriptions of the input fields are given below:

1) **Percent of dry feed going to fines:** Enter the % dry feed going into the fines as % wt based on the wt of the dry feed.

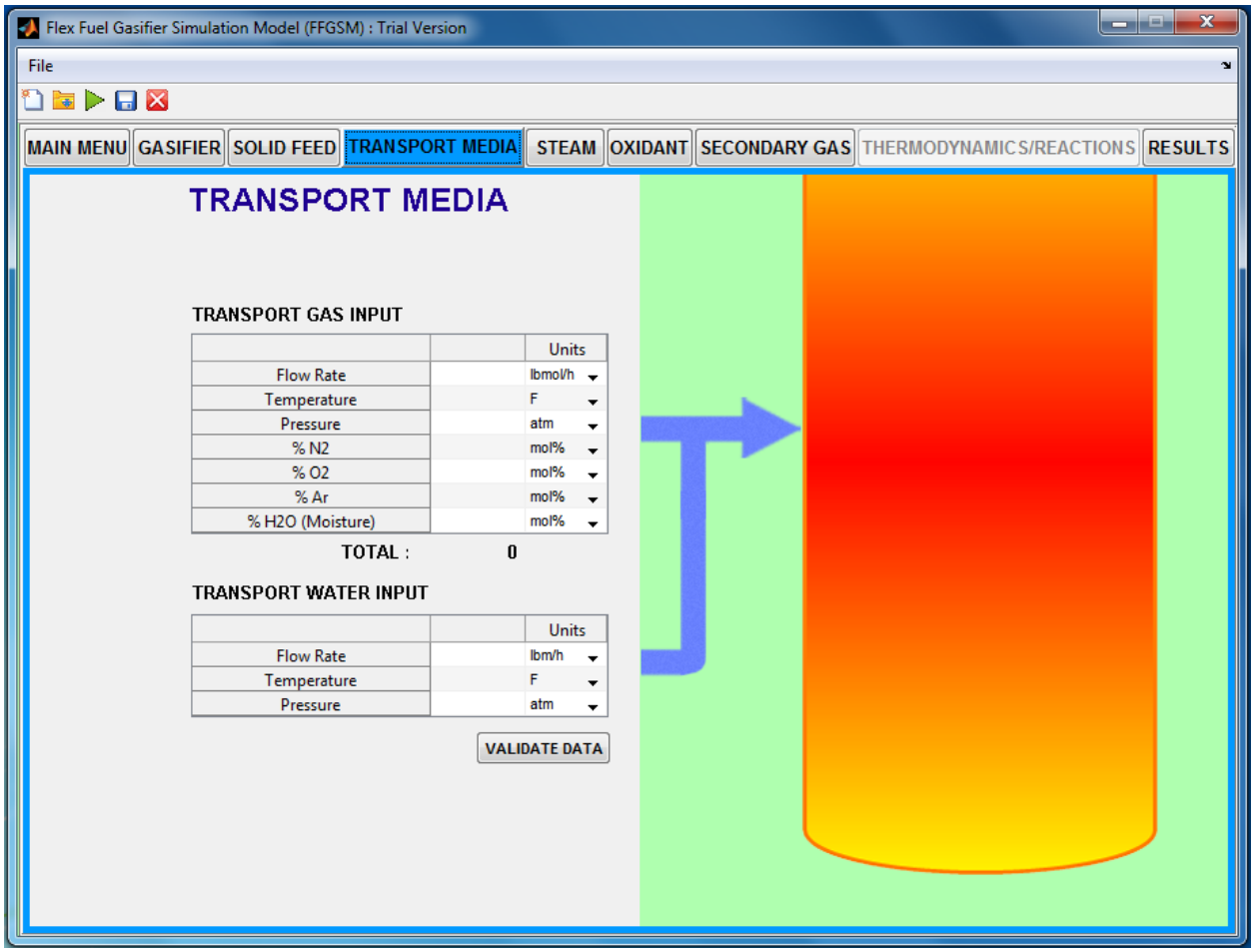
2) **Elemental Conversion in the Fines:** Enter the % conversion of each species in the fines. The value for Ash is 0(zero) because it is assumed that Ash doesn't get converted into any other compound. Trying to change the value for Ash generates the following error flag:

Clicking 'OK' closes the error message and sets the value of the Ash field to 0 again.

3) **Elemental Conversion in the Discharges:** Enter the % conversion of each species in the fines. The value for Ash is 0 because of the same reason described in 2 above.

Transport Media Tab

This tab opens the Transport Media Panel which is shown below. Transport Media Panel contains the input fields where the data for liquid transport media (like water) and transport gas (like Nitrogen rich gas) is entered.



The input fields present in the transport media panel are described below.

TRANSPORT GAS INPUT

1) **Flow Rate:** The molar flow rate of the transport gas in 'lbmol/h'.

2) **Temperature:** The temperature of the transport gas.

3) **Pressure:** The pressure of the transport gas.

4) **% Nitrogen:** The percentage of nitrogen in the transport gas.

5) **% Oxygen:** The percentage of oxygen in the transport gas.

6) **% Argon:** The percentage of argon in the transport gas.

7) **% H2O:** The percentage of moisture in the transport gas.

TRANSPORT WATER INPUT

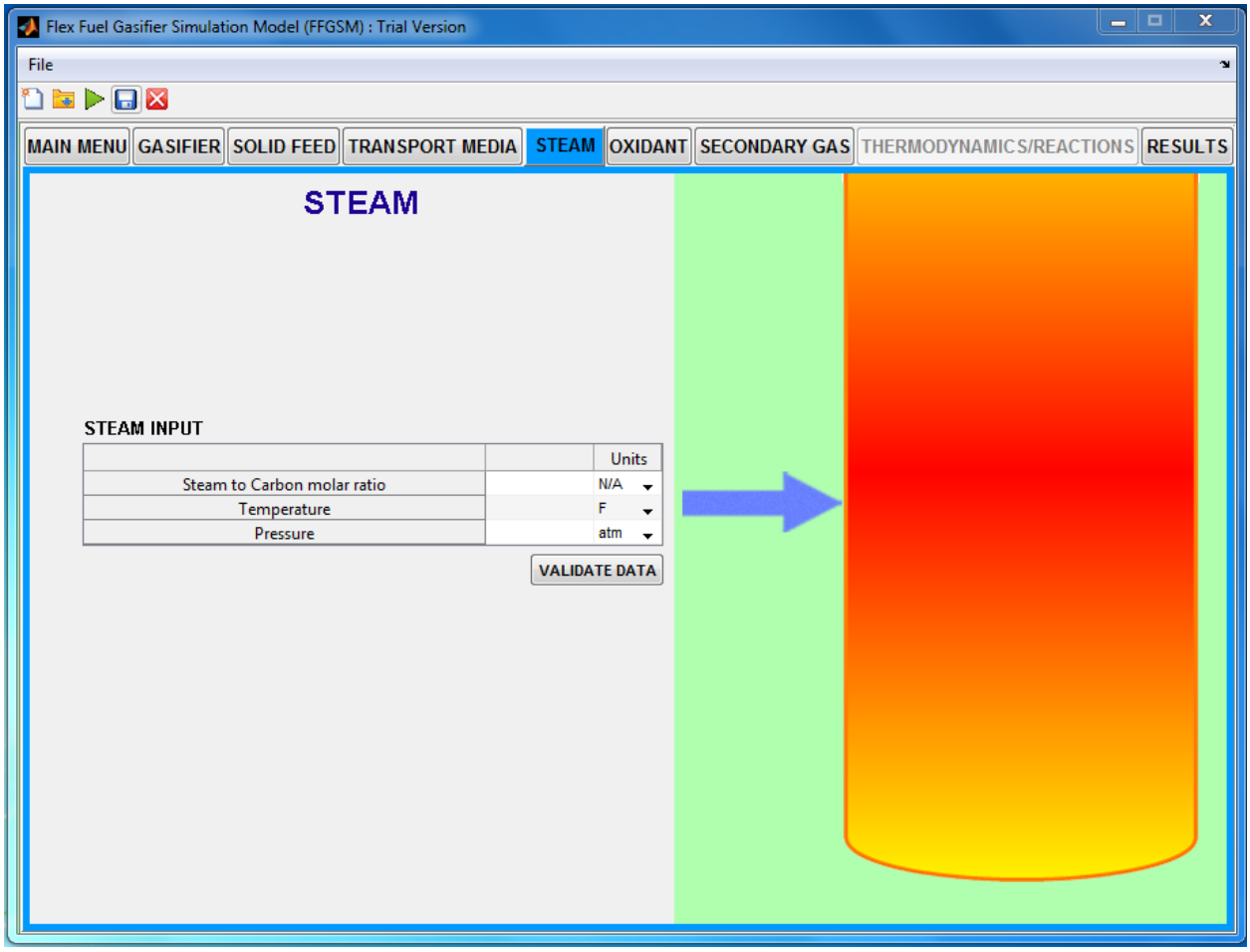
1) **Flow Rate:** The mass flow rate of the water in 'lbm/h'.

2) **Temperature:** The temperature of the transport water.

3) **Pressure:** The pressure of the transport water.

Steam Tab

This tab opens the Steam Panel which is shown below. Steam Panel contains the input fields where the data for steam input has to be entered.



The input fields present in the steam panel are described below:

STEAM INPUT

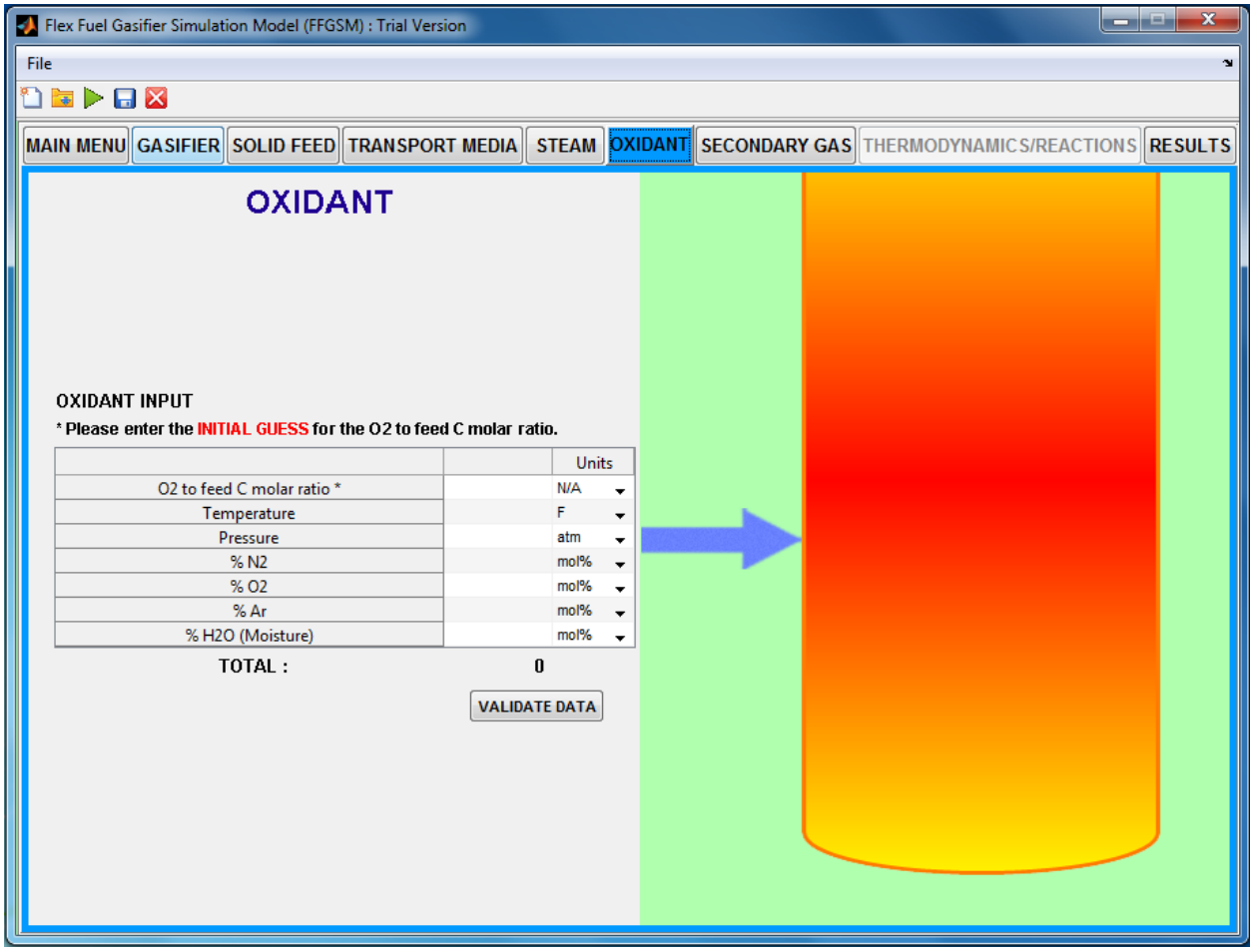
1) **Steam to Carbon molar ratio:** The ratio of the number of moles of steam (H_2O) supplied to the number of moles of carbon present in the dry feed. It has no units because it is the ratio of two same quantities.

2) **Temperature:** Temperature of the steam.

3) **Pressure:** Pressure of the steam.

Oxidant Tab

This tab opens the Oxidant Panel which is shown below. Oxidant Panel contains the input fields where the data for oxidant gas has to be entered.



The input fields present in the oxidant panel are described below:

1) **Oxygen to Carbon molar ratio:** The ratio of the number of moles of oxygen supplied to the number of moles of carbon present in the dry feed. It has no units because it is the ratio of two same quantities.

2) **Temperature:** The temperature of the oxidant gas.

3) **Pressure:** The pressure of the oxidant gas.

4) **% Nitrogen:** The percentage of nitrogen in the oxidant gas.

5) **% Oxygen:** The percentage of oxygen in the oxidant gas.

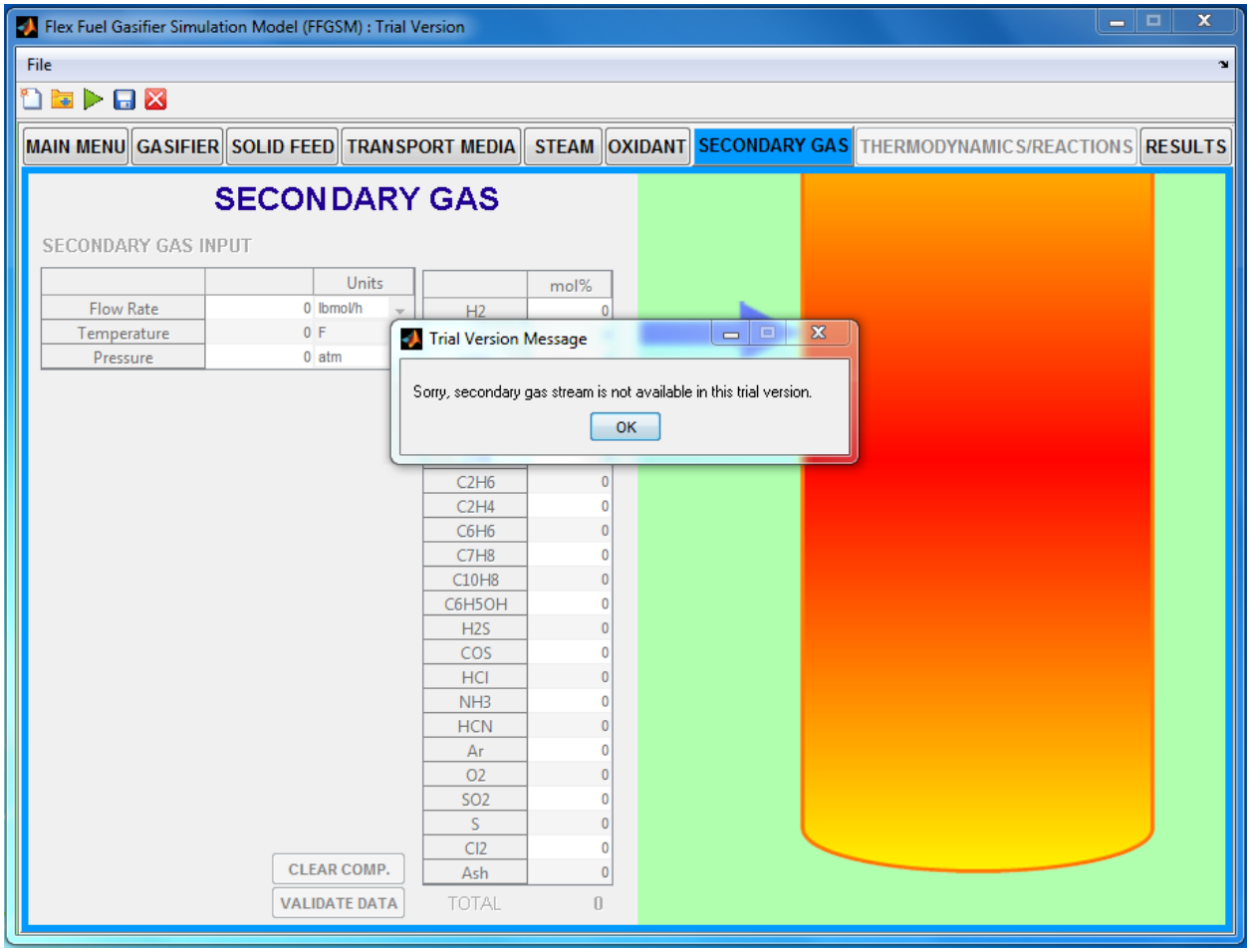
6) **% Argon:** The percentage of argon in the oxidant gas.

7) **% H2O:** The percentage of moisture in the oxidant gas.

The ‘VALIDATE DATA’ button checks if all the inputs are entered and if the % composition of the oxidant gas adds up to 100%.

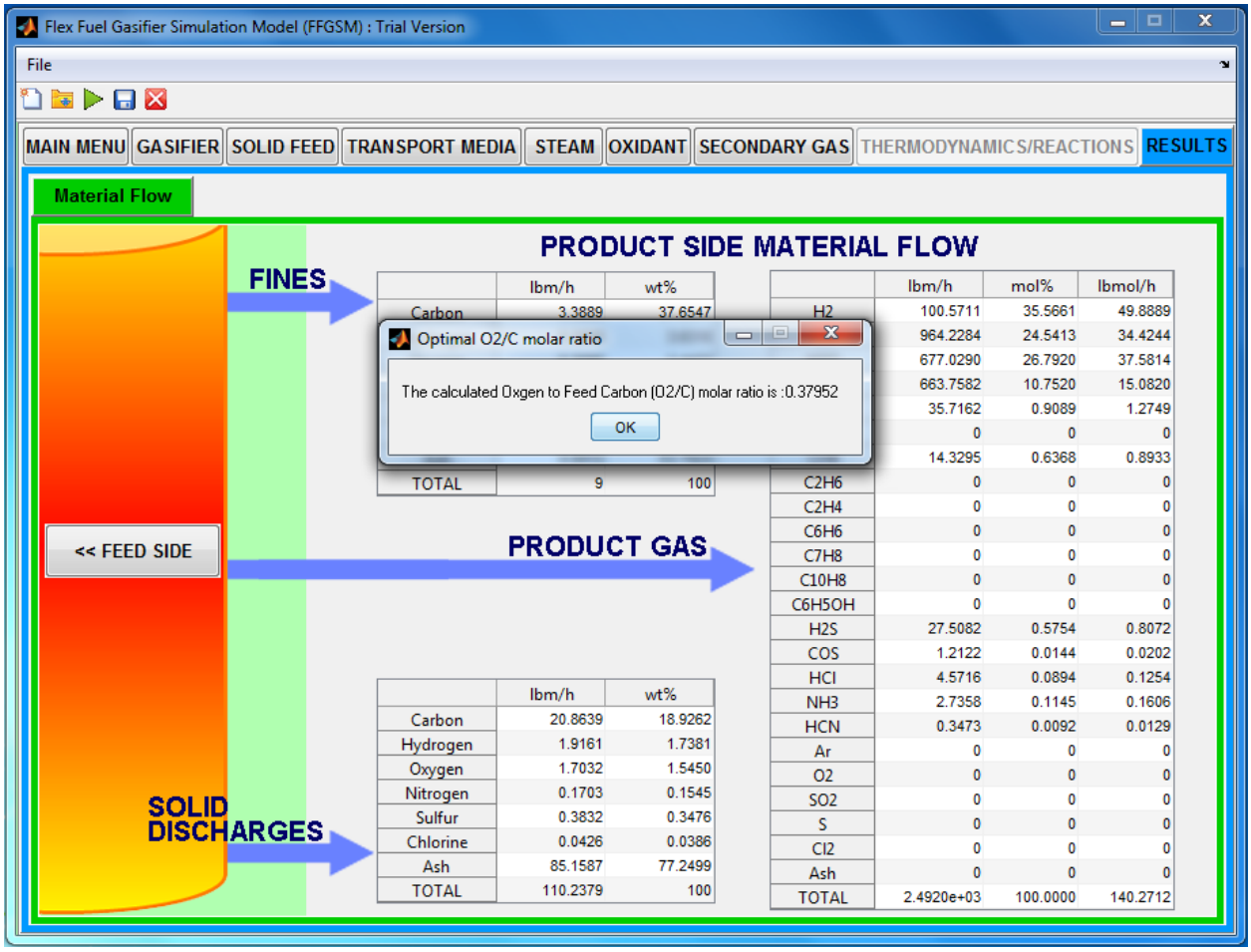
Secondary Gas Tab

This option is not available in the trial version.



Results Tab

The Results Tab provides access to the Results Panel which is shown below.



Results Panel (showing the Product Side Material Flow)

The Results panel contains the tables for Fines, Discharges and Product Gas which will display the results.

1) **Fines:** This table displays the mass flow rate (in 'lbm/h') of the standard species (species that are present in the feed) in the fines along with the '% wt' of the species.

2) **Discharges:** This table displays the mass flow rate (in 'lbm/h') of the standard species (species that are present in the feed) in the dischargesalong with the '% wt' of the species.

3) **Product Gas:** This table displays the mass flow rate (in 'lbm/h'), mol %, and the molar flow rate (in 'lbmol/h') of all the product species.

The 'Feed Side' Tab provides access to the feed side panel which shows the Feed side Material Flow as shown below.

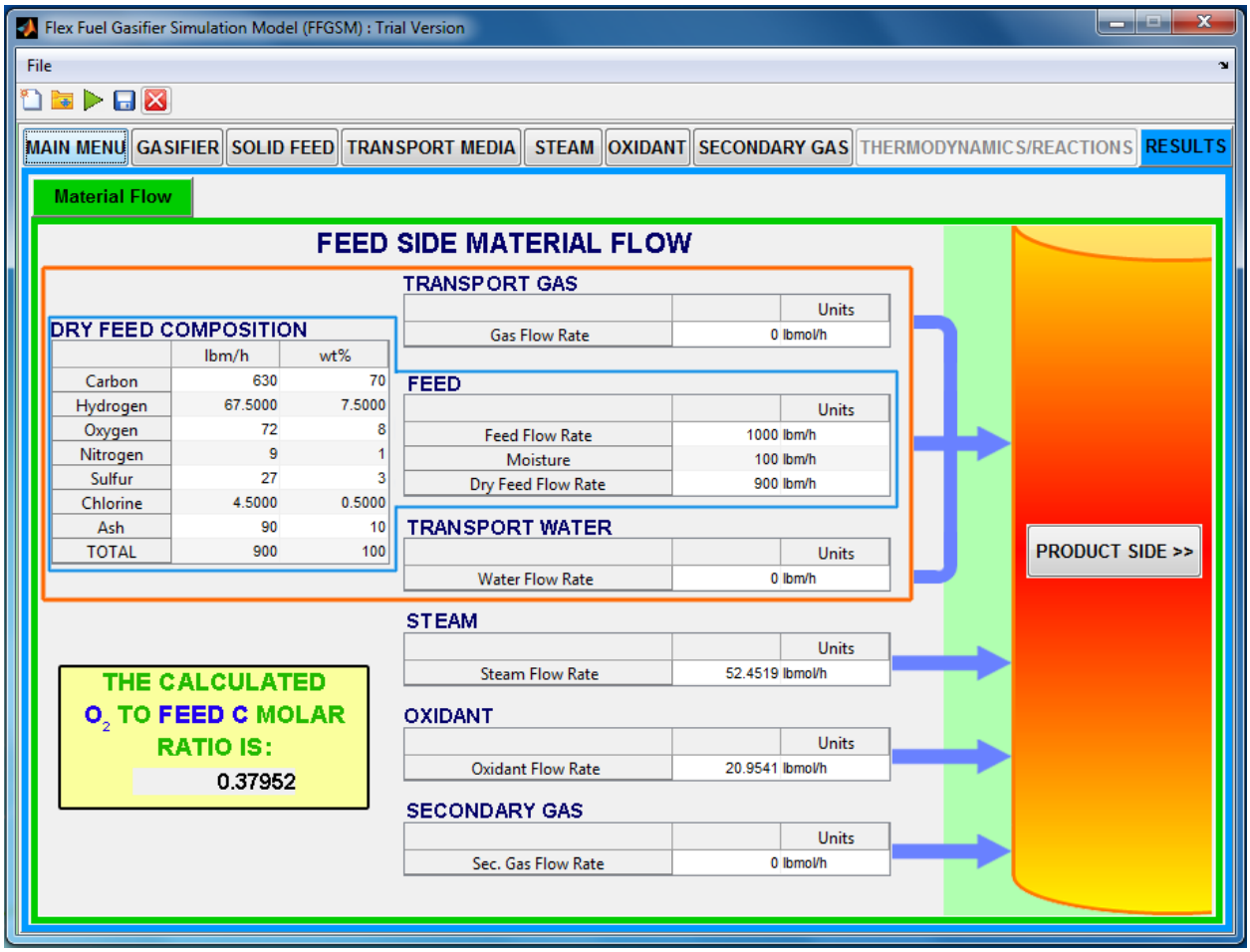


Figure 20.0 Results Panel (showing the Feed Side Material Flow)

This panel shows the material flow of the following streams:

1) **Transport Gas:** This table shows the transport gas mass flow rate in 'lbmol/h'.

2) **Feed:** The table on the top left shows the total feed mass flow rate (sum total of the mass flow rates of all the visible feed streams), total moisture flow rate, and the total dry mass flow rate in the units of 'lbm/h'.
   The table next to it shows the total mass flow rate (in 'lbm/h') of the species present in the feed and their '% wt'.

3) **Transport Water:** This table shows the transport water mass flow rate in 'lbm/h'.

4) **Steam:** This table shows the steam mass flow rate in 'lbm/h'.

5) **Oxidant:** This table shows the oxidant molar flow rate in 'lbmol/h'.

6) **Secondary Gas:** This table shows the secondary gas molar flow rate in ‘lbmol/h’.

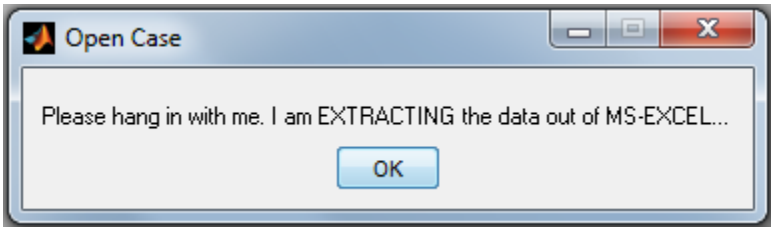
The 'Product Side' Tab provides access to the product side panel which is shown above.

Loading Data from a file into the FFGSM Application

Data can be loaded from an MS-Excel file (if the file with the correct template is selected). A file with an example case is supplied along with the application package. It is called 'Sample Case_0.xlsx'. The file contains three sheets: INPUT SHEET, OUTPUT SHEET and REPORT SHEET.

Steps to open (load) a saved case.

1) Click on File → Open Case. Alternatively, the Open Case Icon can also be clicked to open the "Select File to Open" dialog box.
2) Select the correct file and click Open.
3) The following "Open Case" dialog box appears:



4) It might take a while for the file to load and fill the input fields in the GUI. Once the data is loaded into the GUI, the dialog box closes automatically.

Note: If a file is selected which is not an excel file or if an excel file is selected which is not of the correct template, the above shown "Open Case" dialog box will appear and won't close. If you ever run into that situation, please exit the application and re-run it. In order to avoid that, please make sure that the file you select to open is an excel file and has the correct template (basically the excel file that contains the INPUT SHEET and OUTPUT SHEET shown below).

5) After you load the file, you can click the Run Case Icon to run the case.
6) Only after the calculations are correctly performed, you can view the results by clicking on the 'RESULTS' tab.

GASIFIER INPUT SHEET

User Name :	0
Case Num. :	0

GASIFIER OPERATING CONDITIONS

System Pressure	0	psig
Bed Temperature	0	F
Fines Temperature	0	F
Discharge Temperature	0	F
WGS Equilibrium Temp.	0	F
Gasifier Heat Loss	0	Btu/h

SOLID FEED INPUT

Number of Feed Streams	3

STREAM 1

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

Flow Rate	0	lbm/h
Temperature	0	F
Pressure	0	psig
Moisture	0	wt%

Feed Composition (dry feed):

Carbon	0	wt%
Hydrogen	0	wt%
Oxygen	0	wt%
Nitrogen	0	wt%
Sulfur	0	wt%
Chlorine	0	wt%
Ash	0	wt%
Total	0	wt%

STREAM 2

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

Flow Rate	0	lbm/h
Temperature	0	F
Pressure	0	psig
Moisture	0	wt%

Feed Composition (dry feed):

Carbon	0	wt%
Hydrogen	0	wt%
Oxygen	0	wt%
Nitrogen	0	wt%
Sulfur	0	wt%
Chlorine	0	wt%
Ash	0	wt%
Total	0	wt%

STREAM 3

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

Flow Rate	0	lbm/h
Temperature	0	F
Pressure	0	psig
Moisture	0	wt%

Feed Composition (dry feed):

Carbon	0	wt%
Hydrogen	0	wt%
Oxygen	0	wt%
Nitrogen	0	wt%
Sulfur	0	wt%
Chlorine	0	wt%
Ash	0	wt%
Total	0	wt%

FINES AND DISCHARGES

STREAM 1

Amount of Dry Feed to the Fines:

% wt of dry feed	0	wt%

Elemental Conversion in the Fines:

	Fines (wt%)	Discharges(wt%)
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0

STREAM 2

Amount of Dry Feed to the Fines:

% wt of dry feed	0	wt%

Elemental Conversion in the Discharges:

	Fines (wt%)	Discharges(wt%)
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0

STREAM 3

Amount of Dry Feed to the Fines:

% wt of dry feed	0	wt%

Elemental Conversion in the Discharges:

	Fines (wt%)	Discharges(wt%)
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0

STEAM INPUT

Steam to C molar ratio	0	N/A
Temperature	0	F
Pressure	0	psig

TRANSPORT GAS INPUT

Flow Rate	0	lbmol/h
Temperature	0	F
Pressure	0	psig
% Nitrogen	0	mol%
% Oxygen	0	mol%
% Argon	0	mol%
% H2O	0	mol%
TOTAL	0	mol%

SECONDARY GAS FEED

Flow Rate	0	lbmol/h
Temp.	0	F
Pressure	0	psig

H2	0	mol%
CO	0	mol%
H2O	0	mol%
CO2	0	mol%
N2	0	mol%
C	0	mol%
CH4	0	mol%
C2H6	0	mol%
C2H4	0	mol%
C6H6	0	mol%
C7H8	0	mol%
C10H8	0	mol%
C6H5OH	0	mol%
H2S	0	mol%
COS	0	mol%
HCl	0	mol%
NH3	0	mol%
HCN	0	mol%
Ar	0	mol%
O2	0	mol%
SO2	0	mol%
S	0	mol%
Cl2	0	mol%
Ash	0	mol%
TOTAL	0	mol%

OXIDANT INPUT

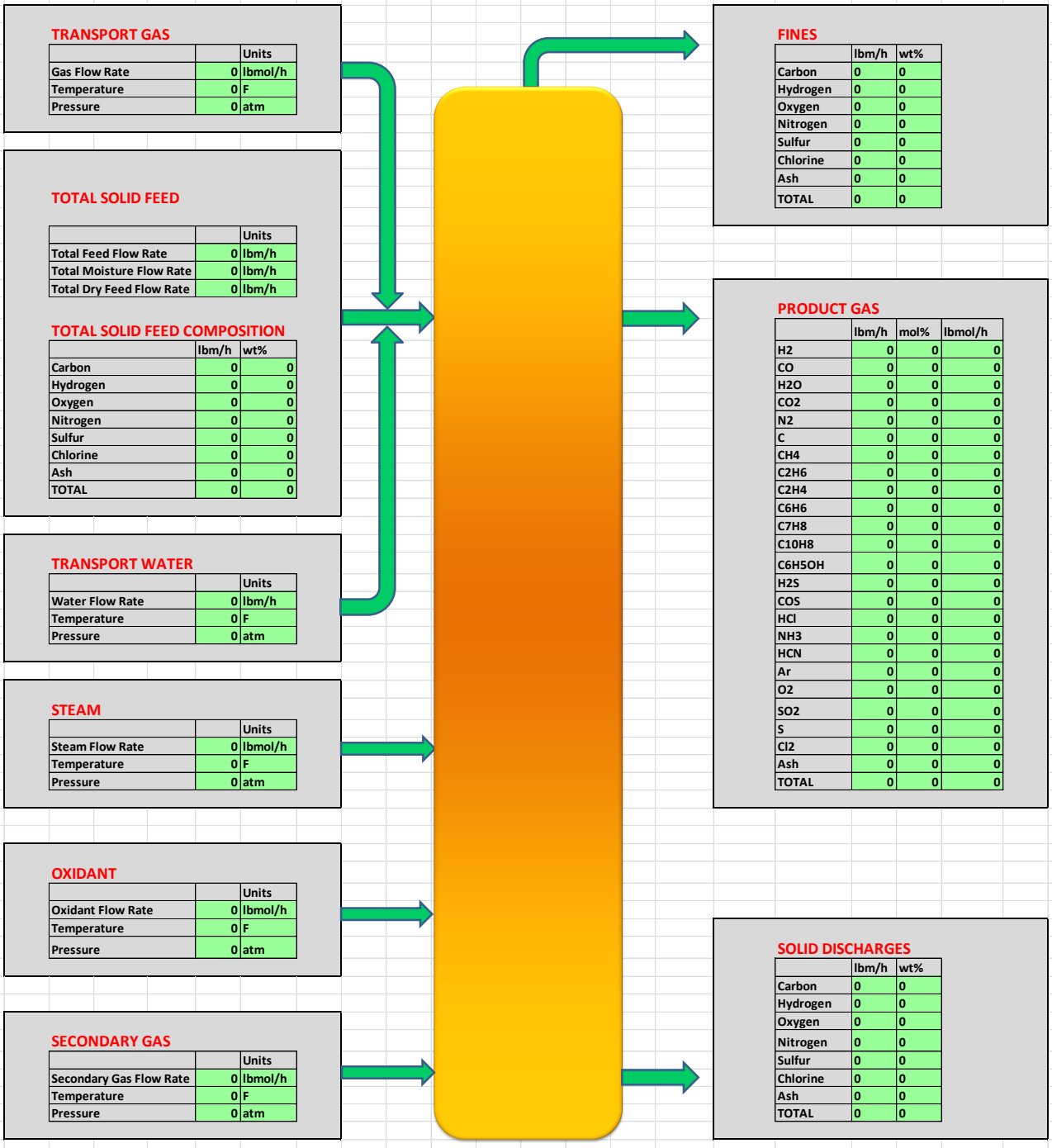
* Please enter the INITIAL GUESS for the O2 to feed C molar ratio

O2 to C Molar Ratio *	0	N/A
Temperature	0	F
Pressure	0	psig
% Nitrogen	0	mol%
% Oxygen	0	mol%
% Argon	0	mol%
% H2O	0	mol%
TOTAL	0	mol%

TRANSPORT WATER INPUT

Flow Rate	0	lbm/h
Temperature	0	F
Pressure	0	psig

GASIFIER OUTPUT SHEET



TRANSPORT GAS

		Units
Gas Flow Rate	0	lbmol/h
Temperature	0	F
Pressure	0	atm

TOTAL SOLID FEED

		Units
Total Feed Flow Rate	0	lbm/h
Total Moisture Flow Rate	0	lbm/h
Total Dry Feed Flow Rate	0	lbm/h

TOTAL SOLID FEED COMPOSITION

	lbm/h	wt%
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0
TOTAL	0	0

TRANSPORT WATER

		Units
Water Flow Rate	0	lbm/h
Temperature	0	F
Pressure	0	atm

STEAM

		Units
Steam Flow Rate	0	lbmol/h
Temperature	0	F
Pressure	0	atm

OXIDANT

		Units
Oxidant Flow Rate	0	lbmol/h
Temperature	0	F
Pressure	0	atm

SECONDARY GAS

		Units
Secondary Gas Flow Rate	0	lbmol/h
Temperature	0	F
Pressure	0	atm

FINES

	lbm/h	wt%
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0
TOTAL	0	0

PRODUCT GAS

	lbm/h	mol%	lbmol/h
H2	0	0	0
CO	0	0	0
H2O	0	0	0
CO2	0	0	0
N2	0	0	0
C	0	0	0
CH4	0	0	0
C2H6	0	0	0
C2H4	0	0	0
C6H6	0	0	0
C7H8	0	0	0
C10H8	0	0	0
C6H5OH	0	0	0
H2S	0	0	0
COS	0	0	0
HCl	0	0	0
NH3	0	0	0
HCN	0	0	0
Ar	0	0	0
O2	0	0	0
SO2	0	0	0
S	0	0	0
Cl2	0	0	0
Ash	0	0	0
TOTAL	0	0	0

SOLID DISCHARGES

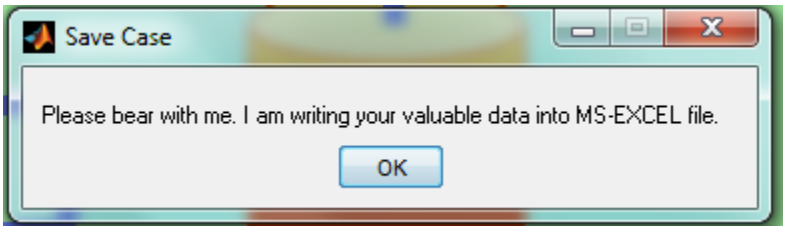
	lbm/h	wt%
Carbon	0	0
Hydrogen	0	0
Oxygen	0	0
Nitrogen	0	0
Sulfur	0	0
Chlorine	0	0
Ash	0	0
TOTAL	0	0

The Calculated Optimal Oxygen to Carbon Molar Ratio is: 0

Saving Data from the FFGSM Application to an MS-Excel File

Data from the GUI can be saved in an excel file in the correct template shown above. Data can be saved only after a case is successfully run. In order to save the data:

1) Select File → Save Case or click on the 'Save Case' Icon on the toolbar.
2) It will prompt for a file name. A default file name appears which is the combination of username and case number fields.
3) You can either use the default file name or give a different file name, select the location to save the file and click on 'Save'
4) A dialog box appears:



5) After the excel file is successfully generated, it opens automatically in to the OUTPUT SHEET section.

Formal Report Sheet

The program also generates a complete formal report which includes a detailed description of all the input and the output streams as a separate tab (**REPORT SHEET**) in the MS-Excel file.

A sample of the REPORT SHEET is shown below.

GASIFIER REPORT

****

User Name :	0
Case Num. :	0

****

GASIFIER OPERATING CONDITIONS

		Units
System Pressure	0.000	psig
Bed Temperature	0.000	F
Fines Temperature	0.000	F
Discharge Temperature	0.000	F
WGS Equilibrium Temp.	0.000	F
Gasifier Heat Loss	0.000	Btu/h

****

SOLID FEED INPUT

Number of Feed Streams	3

STREAM 1: FEED SPECS

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

		Units
Flow Rate	0.000	lbm/h
Temperature	0.000	F
Pressure	0.000	psig
Moisture	0.000	wt%

Feed Composition (dry feed):

		Units
Carbon	0.000	wt%
Hydrogen	0.000	wt%
Oxygen	0.000	wt%
Nitrogen	0.000	wt%
Sulfur	0.000	wt%
Chlorine	0.000	wt%
Ash	0.000	wt%
Total	0.000	wt%

STREAM 1 : FINES AND DISCHARGES

Amount of Dry Feed to the Fines:

		Units
% wt of dry feed	0.000	wt%

Elemental Conversion in the Fines:

	Fines (wt%)	Discharges (wt%)
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000

STREAM 2: FEED SPECS

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

		Units
Flow Rate	0.000	lbm/h
Temperature	0.000	F
Pressure	0.000	psig
Moisture	0.000	wt%

Feed Composition (dry feed):

		Units
Carbon	0.000	wt%
Hydrogen	0.000	wt%
Oxygen	0.000	wt%
Nitrogen	0.000	wt%
Sulfur	0.000	wt%
Chlorine	0.000	wt%
Ash	0.000	wt%
Total	0.000	wt%

STREAM 2 : FINES AND DISCHARGES

Amount of Dry Feed to the Fines:

		Units
% wt of dry feed	0.000	wt%

Elemental Conversion in the Fines:

	Fines (wt%)	Discharges (wt%)
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000

STREAM 3: FEED SPECS

Feed Type :	Bituminous
HHV Correlations :	Dulong

Feed Specification:

		Units
Flow Rate	0.000	lbm/h
Temperature	0.000	F
Pressure	0.000	psig
Moisture	0.000	wt%

Feed Composition (dry feed):

		Units
Carbon	0.000	wt%
Hydrogen	0.000	wt%
Oxygen	0.000	wt%
Nitrogen	0.000	wt%
Sulfur	0.000	wt%
Chlorine	0.000	wt%
Ash	0.000	wt%
Total	0.000	wt%

STREAM 3 : FINES AND DISCHARGES

Amount of Dry Feed to the Fines:

		Units
% wt of dry feed	0.000	wt%

Elemental Conversion in the Fines:

	Fines (wt%)	Discharges (wt%)
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000

****

STEAM INPUT

		Units
Steam to C molar ratio	0.000	N/A
Temperature	0.000	F
Pressure	0.000	psig

****

TRANSPORT GAS INPUT

		Units
Flow Rate	0.000	lbmol/h
Temperature	0.000	F
Pressure	0.000	psig
% Nitrogen	0.000	mol%
% Oxygen	0.000	mol%
% Argon	0.000	mol%
% H2O	0.000	mol%
TOTAL	0.000	mol%

****

TRANSPORT WATER INPUT

		Units
Flow Rate	0.000	lbm/h
Temperature	0.000	F
Pressure	0.000	psig

****

AIR / OXYGEN INPUT

		Units
O2 to C Molar Ratio	0.000	N/A
Temperature	0.000	F
Pressure	0.000	psig
% Nitrogen	0.000	mol%
% Oxygen	0.000	mol%
% Argon	0.000	mol%
% H2O	0.000	mol%
TOTAL	0.000	mol%

****

SECONDARY GAS FEED

		Units
Flow Rate	0.000	lbmol/h
Temp.	0.000	F
Pressure	0.000	psig

Elements		Units
H2	0.000	mol%
CO	0.000	mol%
H2O	0.000	mol%
CO2	0.000	mol%
N2	0.000	mol%
O2	0.000	mol%
C	0.000	mol%
Cl	0.000	mol%
S	0.000	mol%
H2S	0.000	mol%
COS	0.000	mol%
HCl	0.000	mol%

NH3	0.000	mol%
HCN	0.000	mol%
Ar	0.000	mol%
CH4	0.000	mol%
C2H6	0.000	mol%
C2H4	0.000	mol%
C6H6	0.000	mol%
C7H8	0.000	mol%
C10H8	0.000	mol%
C6H5OH	0.000	mol%
Ash	0.000	mol%
SO2	0.000	mol%
TOTAL	0.000	mol%

****

RESULTS

****

FEED

		Units
Total Feed Flow Rate	0.000	lbm/h
Total Moisture Flow Rate	0.000	lbm/h
Total Dry Feed Flow Rate	0.000	lbm/h

****

TOTAL FEED COMPOSITION

	lbm/h	wt%
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000
TOTAL	0.000	0.000

****

TRANSPORT GAS

		Units
Gas Flow Rate	0.000	lbmol/h
Temperature	0.000	F
Pressure	0.000	atm

****

TRANSPORT WATER

		Units
Water Flow Rate	0.000	lbm/h
Temperature	0.000	F
Pressure	0.000	atm

****

****

STEAM

		Units
Steam Flow Rate	0.000	lbmol/h
Temperature	0.000	F
Pressure	0.000	atm

****

OXIDANT

		Units
Oxidant Flow Rate	0.000	lbmol/h
Temperature	0.000	F
Pressure	0.000	atm

****

SECONDARY GAS

		Units
Secondary Gas Flow Rate	0.000	lbmol/h
Temperature	0.000	F
Pressure	0.000	atm

****

FINES

	lbm/h	wt%
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000
TOTAL	0.000	0.000

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SOLID DISCHARGES

	lbm/h	wt%
Carbon	0.000	0.000
Hydrogen	0.000	0.000
Oxygen	0.000	0.000
Nitrogen	0.000	0.000
Sulfur	0.000	0.000
Chlorine	0.000	0.000
Ash	0.000	0.000
TOTAL	0.000	0.000

****

PRODUCT GAS

	lbm/h	mol%	lbmol/h
H2	0.000	0.000	0.000
CO	0.000	0.000	0.000
H2O	0.000	0.000	0.000
CO2	0.000	0.000	0.000
N2	0.000	0.000	0.000
C	0.000	0.000	0.000
CH4	0.000	0.000	0.000
C2H6	0.000	0.000	0.000
C2H4	0.000	0.000	0.000
C6H6	0.000	0.000	0.000
C7H8	0.000	0.000	0.000
C10H8	0.000	0.000	0.000
C6H5OH	0.000	0.000	0.000
H2S	0.000	0.000	0.000
COS	0.000	0.000	0.000
HCl	0.000	0.000	0.000
NH3	0.000	0.000	0.000
HCN	0.000	0.000	0.000
Ar	0.000	0.000	0.000
O2	0.000	0.000	0.000
SO2	0.000	0.000	0.000
S	0.000	0.000	0.000
Cl2	0.000	0.000	0.000
Ash	0.000	0.000	0.000
TOTAL	0.000	0.000	0.000